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## Practical Care Support During the Early Recovery Period After Acute Coronary Syndrome

Alexandra M. Hajduk<sup>1</sup>, Jacquelyn E. Hyde<sup>2</sup>, Molly E. Waring<sup>2</sup>, Darleen M. Lessard<sup>2</sup>, David D. McManus<sup>2</sup>, Elizabeth B. Fauth<sup>3</sup>, Stephenie C. Lemon<sup>2</sup>, and Jane S. Saczynski<sup>4</sup>

<sup>1</sup>Yale School of Medicine, New Haven, CT, USA

<sup>2</sup>University of Massachusetts, Worcester, MA, USA

<sup>3</sup>Utah State University, Logan, CO, USA

<sup>4</sup>Northeastern University, Boston, MA, USA

### Abstract

**Objective**—To describe the prevalence and predictors of receipt of practical support among acute coronary syndrome (ACS) survivors during the early post-discharge period.

**Method**—406 ACS patients were interviewed about receipt of practical (instrumental and informational) support during the week after discharge. Demographic, clinical, functional, and psychosocial predictors of instrumental and informational practical support were examined.

**Results**—81% of participants reported receiving practical support during the early post-discharge period: 75% reported receipt of instrumental support and 51% reported receipt of informational support. Men were less likely to report receiving certain types of practical support, whereas married participants and those with higher education, impaired health literacy, impaired activities of daily living, and in-hospital complications were more likely to report receiving certain types of practical support.

**Conclusion**—Receipt of practical support is very common among ACS survivors during the early post-discharge period, and type of support received differs according to patient characteristics.

### Keywords

acute coronary syndrome; caregiver; support; disease management; treatment burden

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Corresponding Author: Alexandra M. Hajduk, Yale School of Medicine, 333 Cedar Street, P.O. Box 208025, New Haven, CT 06520, USA. [alexandra.hajduk@yale.edu](mailto:alexandra.hajduk@yale.edu)

Data access: Protocols to request TRACE-CORE data can be found at <http://www.umassmed.edu/qhs/federally-funded-centers/trace-core/>

### Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Introduction

In the days and weeks after hospitalization for acute coronary syndrome (ACS), patients are often tasked with initiating disease self-management (e.g., making lifestyle changes, taking medications), monitoring their health (e.g., identifying/treating symptoms), and coordinating care (e.g., scheduling and attending follow-up appointments). This “work” of being a patient, and its impact on patient functioning and well-being, is often referred to as “treatment burden” (Eton et al., 2012; Gallacher, May, & Montori, 2011). High treatment burden, alone or combined with stress from usual life obligations (Al-Hassan & Sagr, 2002; Kovoov et al., 2006), physical limitations (Dodson et al., 2012), or psychological trauma that often accompanies cardiac events (Ayers, Copland, & Dunmore, 2009), can overwhelm patients in the early post-discharge period. Overwhelmed patients often exhibit poor adherence to recommendations for disease management and self-care (Heckman, Mathew, & Carpenter, 2015; Vijan, Hayward, Ronis, & Hofer, 2005), which in turn may negatively affect clinical and quality of life outcomes (Chow et al., 2010; Rasmussen, Chong, & Alter, 2007). A growing body of evidence suggests that patient outcomes can be improved if clinicians understand their patients’ capacity for treatment burden and align treatments to this capacity (Leppin et al., 2014).

An important component of understanding patients’ capacity for treatment burden is identifying their support resources (Leppin et al., 2014). ACS patients’ capacity can be increased, and perceived treatment burden can be reduced, through support from informal (i.e., family and friends) or formal (i.e., paid) caregivers (Ridgeway et al., 2014). Although knowledge about caregiver support after ACS is limited, prior research has shown that more than 50% of cardiac patients anticipate receiving help from caregivers after hospital discharge (Mosca et al., 2011). Caregiver support has been associated with better disease management behaviors in patients with cardiac disease (B. Aggarwal, Liao, & Mosca, 2013; Molloy, Perkins-Porras, Bhattacharyya, Strike, & Steptoe, 2008), but studies examining the effect of caregiving support on mortality in cardiac patients has been mixed (Mosca et al., 2012; Woloshin et al., 1997).

Caregiver support is often categorized into two domains: emotional and practical support. Emotional support consists of providing empathy, love, and trust, whereas practical support consists of providing service or information (Radcliffe, 1987). Receipt of practical support after ACS has been shown to be more influential on medication adherence and cardiac rehabilitation attendance than receipt of emotional support (Molloy et al., 2008), suggesting that practical support is an important component of recovery and secondary prevention in ACS patients. Practical caregiving support can be further classified as instrumental (i.e., assistance with tasks and activities) or informational (i.e., assistance with knowledge or provision of advice; Langford, Bowsher, Maloney, & Lillis, 1997). Instrumental support, examples of which are helping with housework, running errands, or providing transportation to medical appointments, almost always involves the physical presence of the caregiver, but does not necessitate knowledge of the patient’s health condition. In contrast, informational support, such as providing advice about a health problem or assisting in decision making about treatment, can be given in person or remotely (i.e., over the phone), but requires the caregiver to be knowledgeable about the care recipient’s health condition. Therefore, it may

be expected that factors such as physical closeness (e.g., living with a caregiver), or reduced physical capacity of a care recipient (e.g., physical impairments, prolonged hospitalizations, invasive procedures) would be associated with receipt of instrumental care support. Factors such as knowledge (e.g., education, prior experience with condition) or psychological barriers to problem solving or decision making (e.g., depression) may be associated with receipt of informational support.

The majority of work examining support after cardiac events has focused on emotional (or social) support (B. A. F. Aggarwal, Liao, & Mosca, 2008; Fleury, 1993; Leifheit-Limson et al., 2010; Mookadam & Arthur, 2014), and little is known about receipt of practical support after ACS. No studies to date have examined the prevalence of specific types of practical support received by ACS survivors in the early post-discharge period, or what patient-level factors are associated with one type of practical support or the other. Therefore, this study aimed to describe the prevalence of types of practical support received by ACS survivors during the week after hospital discharge. We also conducted an exploratory analysis to identify demographic, psychosocial, functional, and clinical factors associated with receipt of these different types of support.

## Method

### Data Source and Sampling

Data for this analysis were derived from TRACE-CARE, an ancillary study to Transition and Risks in Acute Coronary Events–Center for Outcomes Research and Education (TRACE-CORE), a large longitudinal observational study of nearly 2,200 adults with ACS in Worcester, Massachusetts, and central Georgia. Details of TRACE-CORE (the parent study) have been previously described (Waring et al., 2012).

Briefly, TRACE-CORE study coordinators reviewed computerized hospital records daily for admission diagnoses related to ACS, lists of planned coronary interventions, and laboratory records to identify patients with elevated cardiac biomarkers. After confirming ACS diagnosis using criteria outlined by the American College of Cardiology and American Heart Association (Anderson et al., 2011; Kushner et al., 2009), patients' eligibility for study inclusion was further examined using the following criteria: age ≥ 21 years and ability to communicate in English or Spanish. Patients were ineligible if they developed ACS secondary to another acute condition; had documented delirium; were pregnant, imprisoned, or expected to move out of the area within 18 months; were admitted for palliative care only; or died during the index admission. Eligible patients were approached in-hospital by trained interviewers within 72 hr of admission and, after providing informed consent, completed a 60-minute interview that collected information on demographics, behavioral characteristics, and psychosocial factors. All study protocols were approved by institutional review boards.

From September 2011 to May 2013, consecutive TRACE-CORE participants from the Worcester sites were invited to enroll in TRACE-CARE, an ancillary study to TRACE-CORE designed to further examine psychosocial factors and caregiver support during the early post-discharge period. Details of the ancillary TRACE-CARE study have been

previously described (Waring et al., 2015). Consenting participants ( $n = 585$ , 96% of invited participants) were contacted at home via telephone 1 week (range = 5-10 days) after hospital discharge. Of these 585 consenting participants, 127 could not be reached 1 week post-discharge and 32 refused participation in the follow-up interview. Four hundred twenty-six participants (72% of those eligible) completed a 30-minute interview during which they reported on functional ability, cognitive status, self-management behaviors, and support received from caregivers since discharge. Trained reviewers abstracted data on medical history, ACS type, and in-hospital procedures from participants' medical records.

## Measurements

**Receipt of practical support**—Information on receipt of practical support during the week after discharge was collected via questions based on the Instrumental Activities of Daily Living (IADL) scale (Lawton & Brody, 1969) and heart disease management questions used in TRACE-CORE (Waring et al., 2012). Specifically, participants were asked, "In the past week since your hospital stay, have you received help with ..." three instrumental activities of daily living (housework, shopping, managing medications) and three disease management tasks (e.g., getting to medical appointments, understanding how to manage their condition, identifying symptoms needing medical attention). Participants were also asked whether the support they received with each task came from formal or informal caregivers. We categorized the support received into instrumental and informational domains based on the nature of the support, that is, help with tasks or information (Langford et al., 1997). Instrumental support included help with housework, shopping/errands, and getting to medical appointments. Informational support included help with medication management, identifying symptoms, and provision of advice about managing one's heart condition.

In addition to collecting information on receipt of practical support, we collected participants' perceived need for support by asking, "Since your hospitalization, how much help with daily activities and the management of your heart condition have you needed?" Participants who answered "some," "quite a lot," or "very much" were considered to have expressed a need for support. We also asked participants, "Was there any time in the past week since your hospital stay that you didn't get the caregiving support that you needed?," with response options of yes and no, to ascertain whether participants perceived their care support needs to have been met during the week after hospital discharge.

**Predictors of practical support types**—The selection of demographic, psychosocial, functional, and clinical factors for examination as predictors of receipt of practical care support type was based on clinical insight and known associations with practical support in other populations (National Alliance for Caregiving & American Association of Retired Persons, 2015). All measured demographic, psychosocial, functional, and clinical variables are listed in Table 1.

**Demographic predictors**—Demographic characteristics, including patient race/ethnicity (non-Hispanic White or other), marital status (married/living as married or other), cohabitation status (living alone or with others), and education (high school or less, some

college, college graduate) were collected during the in-hospital interview. Health literacy was collected by asking participants, “How confident are you in filling out medical forms by yourself?”—participants who reported “not at all,” “a little,” or “somewhat” were categorized as having impaired health literacy (Powers, Trinh, & Bosworth, 2013). Health numeracy was collected by asking participants, “Which of the following numbers represents the biggest risk of getting a disease?” with two response option sets (“1 in 100,” “1 in 1,000,” and “1 in 10” and “1%,” “10%,” and “5%”)— participants who answered one or both questions incorrectly were categorized as having impaired health numeracy (Lipkus, Samsa, & Rimer, 2001). Age and sex were collected from inpatient medical records.

**Psychosocial/functional predictors**—Cognitive status was assessed using the Telephone Interview for Cognitive Status, a global cognitive screening test (Brandt, Spencer, & Folstein, 1988); a score of  $\geq 28$  was used to indicate cognitive impairment (Seo et al., 2011). Depression and anxiety were assessed using the Patient Health Questionnaire (Kroenke, Spitzer, & Williams, 2001) and the Generalized Anxiety Disorder Scale (Spitzer, Kroenke, Williams, & Löwe, 2006), respectively; scores of  $>5$  indicated presence of depressive or anxiety symptoms. Participants’ perception of availability of social support was assessed with the abbreviated five-item Medical Outcomes Survey Social Support scale (Sherbourne & Stewart, 1991); a score of  $<12$  indicated low perceived availability of social support. Impairment in activities of daily living (ADLs) was defined as needing help with or being unable to do one or more functions on the Katz scale (Katz & Akpom, 1976). All covariates in this domain were assessed in-hospital, except for ADLs, which were collected 1 week post-discharge.

**Clinical predictors**—Medical history (coronary heart disease, myocardial infarction, heart failure, stroke, diabetes, hyperlipidemia, and atrial fibrillation), in-hospital procedures (percutaneous coronary intervention, coronary artery bypass graft), and complications (cardiac arrhythmias, major bleed, heart failure, acute renal failure, stroke, recurrent myocardial infarction, cardiac arrest, cardiogenic shock, delirium, urinary tract infection, sepsis, fall, pneumothorax, or pneumonia) were abstracted from medical records from the index hospitalization. The Global Registry of Acute Coronary Events (GRACE) risk score (Eagle et al., 2004), representing ACS severity, was calculated from medical history and laboratory values. Length of stay was calculated from discharge records.

## Analytic Procedures

We calculated percentages of any, type-specific (i.e., instrumental or informational), and task-specific (e.g., help with housework, help with identifying symptoms) practical support for descriptive purposes. We then created a four-level outcome variable that categorized participants according to type of practical care support received: (a) instrumental only, (b) informational only, (c) both support types, or (d) neither support type. We examined bivariate associations between type of practical care support received and demographic, psychosocial, functional, and clinical predictors using analyses of variance, rank sum, and chi-square tests. Before analysis, all predictors were checked for normality and collinearity. Length of hospital stay was found to be right skewed and was log-transformed. No correlation coefficients between predictors exceeded 0.60 except for marital status and living

situation (tetrachoric  $\rho = -.93$ ); in cases where both variables were significantly associated with an outcome, marital status alone was included in the model.

We used multivariable-adjusted modified Poisson regression with robust error variance (Zou, 2004) to estimate the associations between demographic, psychosocial, functional, and clinical variables and types of practical support received. We chose this statistical approach because it is considered to be less biased for approximating relative risks when outcomes are common (Camey, Torman, Hirakata, Cortes, & Vigo, 2014). We fit three separate models, examining predictors of receipt of each type of support (instrumental only, informational only, and both types) compared with receipt of neither type of support (reference). Predictors were included in the multivariable-adjusted models if they were associated with the outcome at  $p < .10$  in bivariate analyses. Due to previous evidence of gender-based differences in receipt of caregiver support according to marital status (Hammond, Mochari-Greenberger, Liao, & Mosca, 2012), we examined interaction terms for sex–marital status. We confirmed model goodness of fit with Pearson chi-square goodness-of-fit tests. We performed all analyses using SAS Version 9.3 (Cary, North Carolina) and Stata 13 (College Station, Texas).

## Results

### Sample Characteristics

Of the 426 participants who completed the 1 week post-discharge interview, 10 participants were excluded due to missing data on practical support and 10 participants were excluded due to missing data on covariates, leaving an analytic sample of 406 participants. Participants included in the final sample did not differ from those excluded based on sex, race, marital status, or education, but excluded participants were slightly older (63 vs. 61 years,  $p = .01$ ) and were more likely to have had unstable angina (29% vs. 16%,  $p < .001$ ).

The mean age of the sample was 61 ( $SD = 11$ ) years, 73% were male, 96% were non-Hispanic White, 62% were married, and 21% lived alone. Approximately one third of the sample was college educated. Nearly one quarter had a history of coronary heart disease and 15% were impaired in activities of daily living at 1 week post-discharge. The demographic characteristics of our analytic cohort were similar to that of the parent study (Goldberg et al., 2015), but participants were generally younger than population-based studies of ACS (Manemann et al., 2015). This difference may be due to our criteria of including only patients who had survived their ACS hospitalization and excluding patients with dementia or delirium.

**Prevalence and types of practical support**—Eight in 10 participants (81%) reported receiving practical support from caregivers during the week after hospital discharge (Figure 1), 90% of which was provided by informal caregivers (Table 1). Three-quarters (75%) reported receiving instrumental support and 51% reported receiving informational support (Figure 1). The most common type of instrumental support received was help with cooking, cleaning, and housework (66%). The most common type of informational support received was help with setting medication schedules or receiving reminders to take medications (31%; Figure 1). Nearly one third (31%) of participants reported receiving instrumental



support only, 6% reported receiving informational support only, 45% reported receiving both support types, and 19% reported receiving neither type of support (Table 1). Almost two thirds (63%) of participants reported needing support with everyday tasks and disease management in the week after discharge, and all but 20 participants (95% of the sample) reported that their support needs were met during this time (Table 1).

**Predictors of receipt of instrumental support only**—Compared with participants who reported receipt of neither type of support, participants who reported receipt of instrumental support only were significantly less likely to be male and more likely to be married, college educated, and have expressed a need for support (Table 1). They were less likely to have a history of heart failure but were more likely to have experienced in-hospital complications or have undergone coronary artery bypass grafting (Table 2). In multivariable-adjusted analyses, four predictors were significantly associated with receipt of instrumental support only. Male sex was associated with lower likelihood of receiving instrumental support only (incidence rate ratio [IRR] = 0.65, 95% confidence interval [CI] = [0.54, 0.79]), whereas being married, (IRR = 1.29, 95% CI = [1.05, 1.59]), being college educated (IRR = 1.33, 95% CI = [1.03, 1.72]), and having experienced in-hospital complications (IRR = 1.34, 95% CI = [1.05, 1.78]) were associated with higher likelihood of receipt of instrumental support only (Table 3). The interaction between sex and marital status was not significant in this model. Receipt of coronary artery bypass grafting could not be included in the multivariable model due to perfect prediction (i.e., no participants in the “neither support type” group underwent coronary artery bypass grafting).

**Predictors of receipt of informational support only**—Compared with participants reporting receipt of neither support type, participants reporting receipt of instrumental support only were more likely to have some college education and were more likely to have impaired health literacy (Table 1). In multivariable-adjusted analyses, some college education (IRRs = 4.41, 95% CI = [1.67, 11.66]) and impaired health literacy (IRR = 1.91, 95% CI = [1.01, 6.63]) were independently associated with higher likelihood of receipt of instrumental support only.

**Predictors of receipt of both support types**—In bivariate analyses, participants reporting receipt of both instrumental and informational support were less likely to be male or live alone than participants reporting receipt of neither support type and were more likely to be married or impaired in ADLs (Table 1). Participants reporting receipt of both support types were also less likely to have a prior history of coronary heart disease or heart failure (Table 2). They were less likely to have undergone percutaneous coronary intervention but were more likely to have undergone coronary artery bypass grafting or have experienced in-hospital complications. Average length of hospitalization was significantly longer among participants reporting receipt of both types of care support. In the multivariable-adjusted model, three predictors were significantly associated with receipt of both instrumental and informational support: male sex (IRR = 0.74, 95% CI = [0.64, 0.85]) was associated with a lower likelihood of receipt of both types of support, whereas being married (IRR = 1.42, 95% CI = [1.17, 1.73]) and being impaired in ADLs (IRR = 1.24, 95% CI = [1.07, 1.45]) were associated with higher likelihood of receipt of both types of support. A sex–marital

status interaction term was statistically significant in this model. Compared with unmarried men, married men (IRR = 1.72, 95% CI = [1.28, 2.31]), unmarried women (IRR = 1.88, 95% CI = [1.34, 2.64]), and married women (IRR = 1.94, 95% CI = [1.43, 2.62]) were all more likely to report receiving both types of support. Again, receipt of coronary artery bypass grafting, which was strongly associated with receipt of both support types in bivariate analyses, could not be included in the multivariable model due to perfect prediction.

## Discussion

We found that nearly two thirds of participants surviving an acute coronary event reported needing help in the week after discharge from the hospital, and that eight in 10 participants reported receiving practical support from caregivers during this time. Three out of four participants reported receiving instrumental support and one half reported receiving informational support. The majority of participants reported receiving both instrumental and informational support, followed by instrumental support only and informational support only. In exploratory analyses, we found that male participants were less likely to report receipt of some types of practical support, whereas married participants, those with higher education, impaired health literacy, or ADL impairment were more likely to report receiving certain types of practical care support.

Even in this relatively young (mean age = 61 years) and high-functioning (7% cognitive impairment, 15% ADL impairment) ACS cohort, the high reported rate of need for support (63%) suggests that many ACS patients lack the capacity to independently recover from their cardiac event and initiate disease management behaviors during the early post-discharge period. The high prevalence of receipt of practical support reported in this sample (81%), consistent with results from a previous study of ACS patients (Molloy et al., 2008), highlights the underappreciated burden of ACS care that is assumed by predominantly informal caregivers. Our findings broaden understanding of this burden by detailing what types of practical support are received by ACS survivors and what patient-level factors are associated with receipt of different types of practical support. This new evidence supports the instrumental and informational roles that caregivers play in increasing ACS patients' capacity for treatment burden during the early post-discharge period.

### Patient Characteristics According to Practical Care Support Type

Our exploratory analyses revealed some interesting differences in characteristics among ACS patients reporting receipt of instrumental, informational, or both types of support during the early post-discharge period. We found that men were less likely than women to report receiving instrumental or both types of support, whereas married participants were more likely to report receiving instrumental or both types of support. Our finding that marriage was associated with greater receipt of practical support is not surprising, given prior knowledge that spouses are the primary source of caregiving support for adults with cardiovascular disease (Mosca et al., 2011). Our finding that men were less likely to report receiving instrumental or both types of support is less expected. It is possible that men were not actually less likely to receive these types of support than females, but rather that they



were less likely to identify instrumental tasks performed by their caregivers as “support.” Research on caregiver support in heart failure (Buck, Kitko, & Hupcey, 2013) has found that caregiving roles often reflect traditional relationship roles. For example, if a male patient’s caregiver (e.g., a spouse or child) has traditionally assumed the cooking, cleaning, and other responsibilities in the household throughout his or her relationship, these activities may not necessarily be viewed as “caregiving support” by a male care recipient. It is also possible that receipt of certain types of practical support in men depends on their marital status—our mixed findings for interaction effects between sex and marital status cautiously suggest that unmarried men are less likely to receive some types of practical support compared to married men or married or unmarried women. Further research is needed to clarify whether male ACS patients are truly less likely to receive certain types of practical support, whether they identify receipt of caregiving support differently than female ACS patients, or if receipt of practical support in men differs according to their marital status.

We found that higher education level was associated with an increased likelihood of receipt of instrumental or informational support only. ACS patients with more formal education may more readily understand the importance of self-care disease management, as has been found in heart failure patients (Riegel et al., 2009; Rockwell & Riegel, 2001), and thus be proactive in enlisting caregivers to help meet their care goals during the early recovery period. Alternatively, higher education levels may serve as a proxy for higher socioeconomic status, which may enable access to a more resource- and support-rich social environment than patients with lower education levels. For example, caregivers of participants with higher socioeconomic status may be more likely to have their own source of transportation (for helping participants get to medical appointments) or more flexible work schedules (enabling free time to provide informational support). However, as the association between education level and likelihood of receipt of practical support was not consistent across all types of practical support (i.e., not associated with receipt of both types of support), further work is needed to clarify how patient education/socioeconomic status affects the need for or receipt of practical support after ACS.

In-hospital complications, found to be associated with higher likelihood of reporting receipt of instrumental support only, may serve as a marker of a traumatic hospital course or risk of post-hospital syndrome (Krumholz, 2013), either of which may result in greater need for instrumental support in the early post-discharge period. Impaired health literacy, found to be associated with a higher likelihood of reporting receipt of informational support only, may reflect a deficit in patients’ ability to understand how to manage their disease and the need for support in doing so. We were surprised to find that ADL impairment predicted increased likelihood of receiving both support types, but not instrumental support only—ADL impairments reflect a state of heightened dependence and such vulnerable patients may require a high level of practical support with both instrumental and informational activities during recovery.

Interestingly, age was not associated with receipt of practical support in this study, a finding consistent with another, smaller study examining caregiver support among ACS survivors (Molloy et al., 2008). This finding provides a counterfactual argument to the commonly held belief that caregiving is prevalent or important only in the context of older, debilitated adults,

indicating that clinicians should be diligent in recognizing the need for and receipt of practical care support among ACS survivors across the age spectrum. An alternative explanation for this null finding is that, although over a third of the cohort was 65 years, the modest rates of functional and cognitive impairment suggest a younger physiologic age of these participants. Further research is needed to characterize predictors of receipt of practical support specifically among biologically (and physiologically) older cohorts with ACS.

### Implications for Outcomes and Care Management

Our findings of different predictors for receipt of instrumental and informational support (with some overlap) suggest that there are distinct ACS patient subgroups with unique practical support needs. ACS patients who receive instrumental support only during the early post-discharge period may understand their disease well but face physical challenges in taking care of themselves. Conversely, patients who receive informational support only may be physically capable of taking care of themselves but require help with increasing knowledge about their condition and how to manage it. Clinicians should assess both instrumental and informational support needs before discharging patients hospitalized with ACS and ensure that these distinct support needs can be met by informal caregivers or other resources.

Caregivers, particularly friends and family, may be a convenient, committed, and cost-effective resource to increase adherence to disease management regimens, alleviate patient burden, and improve outcomes in patients with ACS. As mentioned in recent guidelines released by the Hospital-to-Home Initiative of the American College of Cardiology (Wiggins, Rodgers, Didomenico, Cook, & Page, 2013), clinicians should aim to include caregivers in discharge education and discussions about disease management whenever possible. In addition to assessing participants' instrumental and informational support needs, the clinical care team should also assess caregivers' capacity to meet these support needs and tailor disease management regimens to fit the patients' (and caregivers') capacity for burden.

### Strengths and Limitations

This study is strengthened by use of data from a prospective cohort that captured detailed information on demographic, clinical, and psychosocial factors during hospitalization as well as receipt of caregiver support during the critical early post-discharge period. We collected information on the types of practical support received by ACS patients, which has not been previously reported, and linked type of support received to patient characteristics. However, our sample, although substantially larger than a previous study examining practical support after ACS (Molloy et al., 2008), may not have been sufficiently large to detect significant associations for the rarest support group (informational support only,  $n = 25$ ) or infrequent characteristics (e.g., cognitive impairment). Receipt of coronary artery bypass grafting was perfectly predictive of receipt of practical care support and thus could not be included in the regression models. Furthermore, we did not have information about the frequency or intensity of practical support received. However, 95% of participants reported that their support needs were met, so the amount of support received was perceived

as adequate by the vast majority of participants. Finally, our sample was composed of mainly non-Hispanic White participants; this may limit the generalizability of our findings.

## Conclusion

The current study provides new information about the prevalence, types, and predictors of practical support received by ACS survivors during the early post-discharge period. Questions remain, including whether receipt of practical support is associated with reduced patient burden and better clinical and quality of life outcomes in ACS patients, and if so, which type of practical support is most influential. Improving our understanding of the influence of practical support on these outcomes may inform the development of interventions that help caregivers support ACS survivors in efficient, but impactful, ways—potentially optimizing outcomes for the patient while minimizing burdens to both the patient and caregiver.

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## Biographies

**Alexandra M. Hajduk** is an epidemiologist and postdoctoral fellow in the Yale School of Medicine's Program in Clinical Geriatric Epidemiology and Aging-related Research. Her research focuses on geriatric conditions and patient-centered outcomes in older adults with cardiovascular disease.

**Jacquelyn E. Hyde** is a medical student at Temple University with research interests in health disparities and bioethics. She was the research coordinator for the TRACE-CARE study.

**Molly E. Waring** is an epidemiologist and assistant professor of quantitative health sciences and obstetrics and gynecology at the University of Massachusetts Medical School. Her research focuses on lifestyle change and weight management among older adults with cardiovascular disease and pregnant women.

**Darleen M. Lessard** is a biostatistician at the University of Massachusetts Medical School.

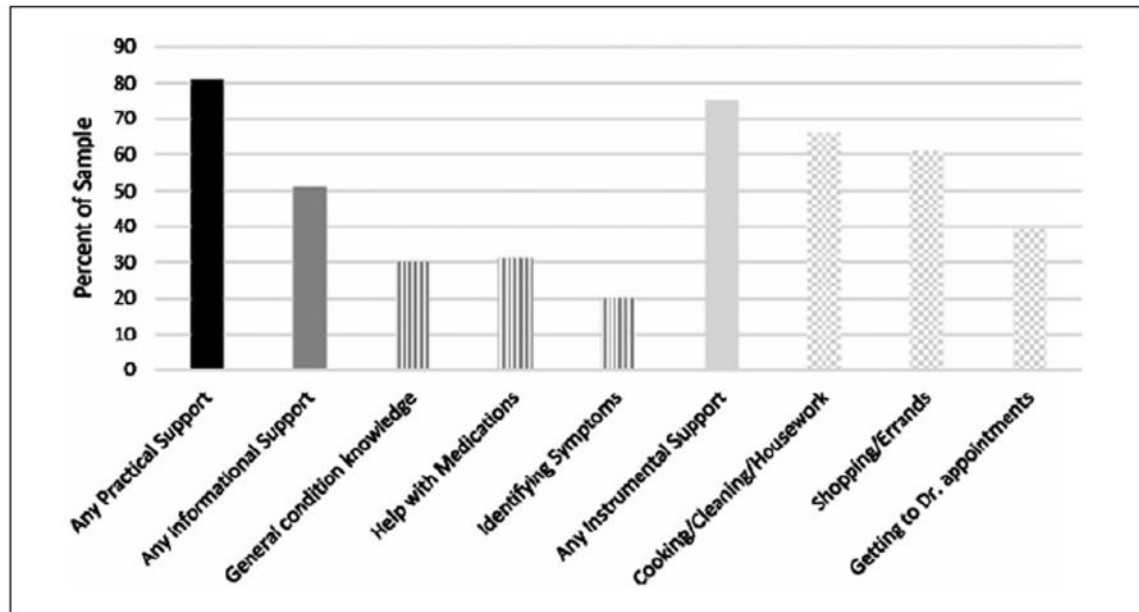
**David D. McManus** is a cardiologist, clinician scientist, and associate professor in the Department of Medicine at the University of Massachusetts Medical School. His research focuses on atrial fibrillation and quality of care.

**Elizabeth B. Fauth** is an associate professor of family, consumer, and human development at Utah State University. Her research focuses on caregiving, quality of life, and function in late life.

**Stephenie C. Lemon** is an epidemiologist and professor of medicine at the University of Massachusetts Medical School with interests in health promotion and translational research. She is also the director of the Worcester County Prevention Research Center.

**Jane S. Saczynski** is an epidemiologist and associate professor of pharmacy and health systems sciences at Northeastern University. Her research interests include cognitive function, dementia, and delirium, with a focus on how cognitive status affects chronic disease management in older adults.





**Figure 1.**  
 Practical care support received by ACS survivors during the week after hospital discharge.  
*Note.* Dark gray denotes any informational support; light gray denotes any instrumental support. Stripes denote instrumental support subdomains; checks denote instrumental support subdomains. ACS = acute coronary syndrome.

Table 1

Participant Characteristics in Relation to Type of Practical Support Provided by Informal Caregivers 1 Week Following Hospitalization for ACS, *N*(%).

	Neither type of support <i>N</i> = 76	Instrumental support only <sup>a</sup> <i>N</i> = 124	Informational support only <sup>b</sup> <i>N</i> = 25	Both support types <i>N</i> = 181	<i>p</i> (overall)
Male (%)	67 (88)	80 (65) <sup>c</sup>	23 (92)	126 (70) <sup>c</sup>	<.001
Age, <i>M</i> ( <i>SD</i> )	60.2 (57.5-62.9)	61.3 (59.3-63.3)	61.7 (57.0-66.3)	60.6 (59.0-62.2)	.88
<55	23 (30)	40 (35)	7 (28)	52 (29)	.49
55-64	28 (37)	30 (24)	8 (32)	63 (35)	
65+	25 (33)	51 (41)	10 (40)	66 (36)	
Non-Hispanic White	64 (86)	109 (89)	23 (92)	158 (89)	.89
Married	33 (43)	72 (58) <sup>c</sup>	14 (56)	130 (72) <sup>c</sup>	<.001
Living situation					.075
Lives alone	23 (30)	28 (23)	6 (24)	29 (16) <sup>c</sup>	
Lives with others	53 (70)	96 (77)	19 (76)	90 (84) <sup>c</sup>	
Education					.010
High school or less	36 (47)	38 (31) <sup>c</sup>	4 (16) <sup>c</sup>	70 (39)	
Some college	22 (29)	39 (31)	15 (60) <sup>c</sup>	50 (28)	
College graduate	18 (24)	47 (38) <sup>c</sup>	6 (24)	61 (34)	
Impaired health literacy	17 (23)	25 (20)	10 (40) <sup>c</sup>	57 (32)	.05
Impaired health numeracy	28 (38)	51 (41)	8 (33)	75 (42)	.83
Impairment in ADLs	5 (7)	8 (6)	2 (8)	45 (25) <sup>c</sup>	<.001
Cognitively impaired	3 (4)	8 (6)	2 (8)	13 (7)	.78
Depressive symptoms	27 (36)	40 (33)	7 (28)	72 (40)	.48
Anxious symptoms	29 (38)	52 (43)	10 (40)	78 (44)	.88
Low perceived availability of social support	7 (9)	6 (5)	1 (4)	6 (3)	.22
Self-reported need for support <sup>d</sup>	12 (16)	77 (63) <sup>c</sup>	7 (28)	159 (88) <sup>c</sup>	<.001
Care support needs unmet <sup>d</sup>	2 (3)	8 (6)	0	10 (6)	.53
Formal versus informal care support <sup>d</sup>					<.001
Informal care support only	—	121 (98)	23 (92)	152 (84)	
Formal care support only	—	2 (2)	2 (8)	0	

	Neither type of support <i>N</i> = 76	Instrumental support only <sup>a</sup> <i>N</i> = 124	Informational support only <sup>b</sup> <i>N</i> = 25	Both support types <i>N</i> = 181	<i>p</i> (overall)
Both formal and informal care support	—	1 (1)	0	29 (16)	

*Note.* ACS = acute coronary syndrome; ADLs = activities of daily living. Bold indicates statistical significance at *p*<0.05.

<sup>a</sup>Instrumental support includes assistance with cooking, cleaning, housework, shopping, errands, or getting to medical appointments.

<sup>b</sup>Informational support includes assistance with information about managing condition, setting medication schedule, taking medications, or identifying symptoms.

<sup>c</sup>Indicates statistically significant difference from “neither support type” group.

<sup>d</sup>Displayed for descriptive purposes only, not included as predictors in multivariable-adjusted models.

**Table 2**

Clinical Characteristics in Relation to Type of Practical Care Support Received by Informal Caregivers During the Week Following Hospitalization for ACS, *N* (%) except where noted.

	Neither support type <i>N</i> = 76	Instrumental support only <sup>a</sup> <i>N</i> = 124	Informational support only <sup>b</sup> <i>N</i> = 25	Both support types <i>N</i> = 181	<i>P</i> (overall)
Medical history					
CHD/angina	23 (30)	35 (28)	6 (24)	30 (17) <sup>c</sup>	<b>.039</b>
Myocardial infarction	19 (25)	32 (26)	5 (20)	39 (22)	.81
Heart failure	11 (14)	6 (5) <sup>c</sup>	1 (4)	10 (5) <sup>c</sup>	.061
Stroke	2 (3)	4 (3)	1 (4)	6 (3)	>.99
Diabetes	15 (20)	39 (31)	5 (20)	45 (25)	.28
Hyperlipidemia	47 (62)	84 (68)	17 (68)	115 (64)	.81
Atrial fibrillation	6 (8)	11 (9)	2 (8)	9 (5)	.50
Dementia	0	1 (<1)	0	0	.55
ACS type					.17
STEMI	11 (15)	16 (13)	1 (5)	30 (17)	
NSTEMI	43 (59)	88 (72)	17 (78)	123 (70)	
Unstable angina	19 (26)	18 (15)	4 (18)	23 (13)	
GRACE risk score (mean, SD)	88.3 (82.3-94.3)	93.5 (89.1-98.0)	89.2 (79.6-98.7)	92.9 (89.3-96.5)	.46
In-hospital procedures					
Percutaneous intervention	60 (79)	95 (77)	21 (84)	118 (65) <sup>c</sup>	<b>.032</b>
Coronary artery bypass graft	0	5 (4) <sup>c</sup>	0	40 (22) <sup>c</sup>	<b>&lt;.001</b>
In-hospital complications <sup>d</sup>	5 (7)	19 (15) <sup>c</sup>	3 (12)	43 (24) <sup>c</sup>	<b>.005</b>
Length of stay, days (median,IQR)	2 (2-3)	2 (2-3)	3 (1-3)	3 (2-7) <sup>c</sup>	<b>.003</b>

*Note.* ACS = acute coronary syndrome; CHD = coronary heart disease; GRACE = Global Registry of Acute Coronary Events; IQR = interquartile range; NSTEMI = non-ST elevation myocardial infarction; SD = standard deviation STEMI = ST elevation myocardial infarction. Bold indicates statistical significance at  $p < 0.05$ .

<sup>a</sup>Instrumental support includes assistance with cooking, cleaning, housework, shopping, errands, getting to medical appointments.

<sup>b</sup>Informational support includes assistance with information about managing condition, setting medication schedule, taking medications, identifying symptoms.

<sup>c</sup>Indicates statistically significant difference from "neither support type" group.

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Includes cardiac arrhythmias, major bleed, heart failure, acute renal failure, stroke, recurrent myocardial infarction, cardiac arrest, cardiogenic shock, delirium, urinary tract infection, sepsis, fall, pneumothorax, pneumonia.

**Table 3**

Predictors of Type of Practical Caregiving Support Received During the Week After ACS Hospitalization.

	Adjusted <sup>ab</sup> incident rate ratio [95% CI]		
	Instrumental support only	Informational support only	Both support types
Gender, male	0.65 [0.54, 0.79]	—	0.74 [0.64, 0.85]
Married/living as married	1.29 [1.05, 1.59]	—	1.42 [1.17, 1.73]
Education <sup>c</sup>			
Some college	1.18 [0.90, 1.54]	4.41 [1.67, 11.66]	—
College graduate	1.33 [1.03, 1.72]	3.01 [0.98, 9.27]	—
Impaired health literacy	—	2.02 [1.08, 3.79]	—
ADL impairment	—	—	1.24 [1.07, 1.45]
History of coronary heart disease	—	—	0.81 [0.65, 1.02]
History of heart failure	0.60 [0.31, 1.16]	—	0.73 [0.48, 1.11]
Receipt of PCI	—	—	0.95 [0.79, 1.15]
In-hospital complications	1.34 [1.05, 1.70]	—	1.12 [0.96, 1.31]
Length of hospital stay, per log day <sup>d</sup>	—	—	1.05 [0.94, 1.16]

Note. ACS = acute coronary syndrome; CI = confidence intervals; ADL = activities of daily living; PCI = percutaneous coronary intervention.

<sup>a</sup> Adjusted for all other variables in the column.

<sup>b</sup> Reference group is no practical caregiving support.

<sup>c</sup> Reference group is high school or less.

<sup>d</sup> Log-transformed.